Beacon

A series of key messages
from works by academics
useful for tackling
industrial animal agriculture
in developing countries

TINY BEAM FUND

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Six studies are featured. They cover:

1. Livestock systems everywhere becoming more capitalist.
2. Importance of maintaining local breeds' genetics in LMICs.
3. Mongolia dairy farmers' decisions to reduce GHG emission.
4. Industrial livestock production expanding in Mexico.
5. Food systems priorities in Africa.
6. Chinese investments' role in Argentina animal agriculture.

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Brief mention (non-academic reports)

1 Moritz, Mark, et al. **"Transformations in livestock systems: Beyond ranching and pastoralism."** *Agriculture and Human Values* (2025): 1689–1705. link.

Livestock systems everywhere are shifting from less to more capitalist forms of production, with serious negative impacts, but capitalism has not conquered all.

Capitalist forces are reshaping livestock systems around the world, increasing inequality and causing environmental harm. But some producers' own values and identities clash with these forces, acting to slow the pace of change driven by capitalism and supplying alternatives to capitalism that may be more equitable, sustainable, and humane.

- Livestock producers worldwide face pressures to become more capitalist: to shift from communal to private land ownership, use hired labor instead of family labor, place emphasis on market-oriented production and profit-making, raise capital to invest in technology and scaling up their operations, take on debt, etc.
- The trend towards increasingly capitalist systems has had a number of negative consequences. Examples include pastoralists losing access to grazing land, conflicts within communities, and pressure to externalize environmental and social harms.
- Various aspects of capitalist systems can conflict with producers' own values and identities, leading them to push back against full adoption. Some Mongolian herders have declined market-based insurance contracts in favor of traditional values of mutual aid and reciprocity; Australian "new peasants" aim to express values such as animal welfare, land restoration, and community solidarity in their livestock-keeping.
- *Transitions to the most capitalist forms of animal production have therefore been slowed by resistance from producers themselves.*

Why is this academic study particularly useful for addressing 'burning questions'?

- This study is relevant to CORP 1: What are the most effective strategies to shift corporate practices in vertically integrated markets dominated by transnational corporations in LMICs toward more equitable, higher-welfare, and environmentally sustainable models?
- To develop effective and long-lasting strategies to shift corporate practices, it is important to understand the overarching system in which corporations operate as well as the principles that undergird them.
- This study situates corporate livestock systems within a broader process of capitalist transformation. Vertically integrated, industrial systems lie at the apex of that transformation.
- The study also argues that other kinds of livestock-keeping are subject to capitalist forces as well, and the trend in LMICs is of moving up the capitalist, corporate, industrial ladder.
- However, the transition is not automatic or complete. There are still livestock systems that are much less capitalist, reluctant to embrace some aspects of capitalism, or explicitly against capitalism. These other systems tend to be more equitable, higher-welfare, and environmentally sustainable.

- This implies that there is value for those not in favor of full industrialization (e.g. activists, funders, governments) to support alternative models. Supporting these less-capitalist producers who are more driven by particular identities and values will translate these producers' own resistance into collective action, policy, and regulations. This may in turn shift corporate practices in vertically integrated markets dominated by transnational corporations in LMICs.

Deeper Dive

1. All livestock systems are influenced by capitalism

- Capitalist forces influence all livestock systems, including those that are often considered non-capitalist or are actively resisting capitalism. Producers operate within capitalism or have to deal with capitalism in varying ways.
- Viewing livestock systems through the lens of capitalism can therefore highlight both obstacles and possibilities in making animal production more sustainable, just, and humane.

2. Livestock systems can be classified according to "how capitalist" they are

- This study proposes that we think of livestock systems as operating *(1) at the margins of capitalism; (2) in a capitalist world; (3) in a capitalist way; or (4) against capitalism.*
- Even *at the margins* of capitalism, producers may sell animals on occasion. Pastoralists in Cameroon exist *in a capitalist world*, selling milk and animals for income and for purposes like paying taxes and dowries, but their production system remains fundamentally unchanged, oriented around the needs of the family.
- As the "pressures, needs, and opportunities" of the capitalist system around them intensify, producers may begin producing specifically for markets, and taking on other aspects of producing *in a capitalist way*.
- Production methods begin to change, and the system may eventually acquire features such as corporate ownership, large scale, debt, and commoditizing externalities (taking part in carbon markets, etc.). *Industrialized animal agriculture is the ultimate expression of capitalist livestock production.*
- Some producers react *against capitalism* by retaining or re-orienting towards values such as sustainability or social justice.
- In reality, the boundaries between these classes are not strict, and systems may possess characteristics from more than one category. Different types of system may also co-exist in the same geographic region, with less- and more-capitalist systems present in both the global north and global south.

3. Overall move towards more capitalist forms of production has profound and wide-ranging consequences

- Some consequences, such as the rise of entrepreneurship, may be empowering. Others are more harmful. Livestock keepers begin to treat land, labor, and animals as capital assets, while becoming treated as assets themselves. Value is extracted from local livestock systems and transferred elsewhere; wealth inequalities in communities tend to deepen.
    - For example: less-wealthy Mongolian herders who buy herd insurance may not receive payouts if losses in an area do not meet pre-defined thresholds, even if losing small numbers of animals would cause them substantial hardship. Value is transferred to wealthier herders and outside actors, while traditional systems of mutual aid are undermined.
- For some producers, purely capitalist motivations conflict with their values and identities. They may think of themselves as businesspeople, for instance, but also care about connections with land, animals, family, and their work.

- These connections may be very strong - Maasai herders have taken up cultivation specifically to generate income to continue raising cattle, because cattle ownership is central to who they are as Maasai.
- These producers are finding ways to resist, reject, or adapt various elements of capitalism, preserving or creating systems that may be more equitable, sustainable, and humane.

2

Barłowska, Joanna, et al. **"Significance of local livestock genetic resources in the context of global food security - A review."** *Annals of Animal Science* 25.3 (2025): 999-1015. link.

Importance of supporting local low-input extensive animal breeds and maintaining their genetics for food availability in LMICs.

Local animal breeds may not produce as much as commercial breeds, but they are robust, thrifty, and can be raised by people with limited resources. Preserving them contributes to food security and gives flexibility to adapt to environmental changes.

- Local, native, or indigenous breeds are those that have existed for decades or more in a particular location. They are generally well-adapted to local conditions, and they retain some genes that have been lost in commercial animals selected primarily for high outputs of meat, milk, and eggs.
- Local breeds tend to be less productive than commercial animals. However, *they can be raised with fewer inputs and using locally-available resources, and they can withstand harsher conditions and are less susceptible to many diseases.*
- Many of the ~1 billion small livestock farmers worldwide raise local animal breeds, meaning that these animals make an important contribution to livelihoods and food security in LMICs.
- Because of their genetic diversity, *these animals may also be valuable in responding to changing conditions*, such as alterations in vegetation, temperature, and disease pressures caused by climate change.

Why is this academic study particularly useful for addressing 'burning questions'?

- This study is relevant to PROD 3: "How does the introduction of high-productivity commercial breeds (that require controlled environments) versus indigenous breeds impact animal welfare, smallholder economic resilience, and input requirements (feed, water, energy, etc.) in LMICs?"
- Although the study is not primarily about commercial breeds and their impacts, it does point out significant differences between commercial and indigenous breeds.
- Some of these differences are related to input requirements, as local breeds can often thrive without commercial feed or temperature-controlled housing. Others relate to smallholder incomes, such as the fact that consumers may pay a premium for products from local breeds raised using traditional practices.
- In general, the study underscores the fact that there are still many indigenous breeds in LMICs, which are widely used for food and income and which have key advantages over commercial breeds.
- It provides reasons for putting effort into maintaining these breeds, even as high-production animals become more widespread in LMICs.

Deeper Dive

1. Small-scale farms still feed many people

- Food insecurity is still a major global issue, with almost 800 million people facing hunger as of 2022. Although the drivers of food insecurity are complex, poverty and unequal food distribution are a substantial part of the problem.
- Small-scale farming remains widespread, including almost 1 billion small livestock producers around the world. While industrial animal production has spread to LMICs, these smaller producers continue to provide both nutrition and incomes for a large number of people.
- Animals raised on small farms (and in "backyard" settings) in LMICs tend to be local or native breeds, which have developed over time to thrive in specific environments.
    - These breeds are comparatively slow-growing, small, and/or have relatively low fertility. In contrast, commercial breeds - such as the "Ross 308" broiler chicken - have been selected to have very high productivity in terms of output per animal.

2. There are many reasons for maintaining local breeds

- It has been argued that the low productivity of local breeds contributes to food insecurity, and that funds used for conserving these animals would be better spent on interventions that more directly target hunger instead.
- This paper counters that local breeds have *specific advantages* that justify putting effort into maintaining them.
- For one, these animals are well-adapted to local conditions. They are more able to withstand extreme temperatures and high altitudes, for example, and often have some natural immunity to diseases and parasites. Several African cattle breeds have innate resistance to tuberculosis and tick-borne diseases; the Djallonké sheep of Cameroon can resist diseases spread by tsetse flies; and China's Min pig has a low mortality rate from bacterial diseases.
- These adaptations mean the animals can be raised without relying on expensive feed or veterinary inputs. *This is essential on small farms which tend to rely on grasslands and home-produced fodder.*
- In addition, local breeds can be profitable to produce. Some studies have found that products from local breeds have more desirable sensory properties (such as more flavorful meat or richly-colored egg yolks) and may be healthier as well. Many consumers will pay a premium for these products. *As food insecurity is caused by poverty as much as a lack of available food, incomes are an important piece of the picture.*
- Finally, local breeds supply a reservoir of genetic diversity that may be necessary for adapting to changing future conditions. For example, the authors describe how sea level rise has changed the mix of vegetation in some coastal areas in southeast Asia, making it unpalatable to sheep and cattle but still acceptable to goats. As changes to climate, feed availability, diseases, and social conditions are unpredictable, conserving a range of animals increases the chances of preserving useful characteristics.
- The study points out that cross-breeding local and commercial animals to improve productivity can be a good strategy. However, it requires careful implementation in order to avoid inbreeding and dilution of valuable genetic traits. Currently, many native cattle breeds are being eroded or even risking extinction because of uncontrolled cross-breeding with imported high-production breeds.

3

Lu, Pengjie, and Guanghua Qiao. **"The influence of climate perception and low-carbon awareness on the emission reduction willingness of decision makers in large-scale dairy farming: Evidence from the midwest of Inner Mongolia, China."** *Sustainability* 16.17 (2024): 7421. link.

Mongolia dairy farmers' decisions to reduce GHG emissions are influenced by multiple factors including farm scale, and their own subjective norms about climate change.

Mongolia dairy farmers' intentions to reduce emissions are shaped by their beliefs about the value of reducing emissions, their perceptions of social pressure, and their confidence in their ability to act. The importance of each of these factors varies with farm size, and smaller-scale farmers are less willing to act.

- Greenhouse gas emissions from dairy farms in Inner Mongolia are quite high, and the government has issued several policies encouraging farms to reduce emissions via practices such as feed additives and changes to manure handling.
- The authors of this study investigated the factors influencing dairy farmers' intention to adopt these practices. They asked farmers about their awareness of climate change, their perceptions of the value of reducing emissions, the beliefs of those around them, and their confidence in their own ability to implement the practices.
- In general, farmers' awareness of climate change *increased* their perception of the value of reducing emissions, which in turn made them more sensitive to social norms and more likely to feel that they had the ability to change their practices.
- *Smaller-scale farms (100 - 1000 cows) turned out to be less willing than larger-scale farms (1000+ cows) to adopt emissions-reducing practices.* They were less able to absorb the costs of these changes and less confident in their ability to implement them. They were also less concerned than large farms about their image and reputation.
- The study only investigated *intentions*, not *actions*. Nonetheless, it suggests that different policies (or implementation mechanisms) may be needed for farms of different sizes. In particular, smaller farms may benefit from additional financial support and technical assistance.

4 Zaldivar-Gomez, Alejandro, et al. **"Multivariate classification of livestock production systems in Mexico."** *Tropical Animal Health and Production Research*, 57.3 (2025): 140. link.

Industrial livestock production in Mexico is expanding but it is important to acknowledge the notable presence of extensive systems and regional variations.

This study identified four broad categories of livestock production systems across Mexico, ranging from intensive systems in the north to semi-extensive systems in the south. The typology provides a foundation for developing targeted, region-specific policies, although data gaps mean that very small farms are not represented.

- The authors of this study compiled many pieces of state-level information about the entire animal agriculture system in Mexico (climate, feed production, labor, regulations, outputs, etc.), then identified the most important variables and determined which characteristics tend to go hand-in-hand.
- They found that 10 northern states have predominantly *intensive and high investment systems*; 18 southern states use *semi-extensive, traditional low-input systems*; three states have *extensive and low infrastructure production systems with vulnerability to poverty*, and a final state (Jalisco) has *both traditional and agroindustrial systems*.
- The underlying data paint a more detailed picture. For example, the extensive systems are operated by a low-income population whose main economic activity is livestock-raising, while the semi-extensive systems exist in temperate environments with high forage yields, and the intensive systems have a high environmental impact.
- This information can help with creating targeted policies such as investing in infrastructure where this is currently lacking, or developing sustainability-focused regulations for the intensive sector.
- The authors note that Mexico does not systematically collect data about *backyard farms, "despite contributing between 20 and 30% of national livestock production"*.
- Given this gap, and the considerable variation within each region and system type, this typology should be seen as a *starting point* for policy and advocacy relating to *better-documented, more formal* types of livestock production.

5 Dorvlo, Selorm Yaotse, et al. **"Transforming African food systems: Perspectives from the Food Systems Network for Africa (FSNet-Africa)."** *Journal of Agriculture and Food Research*, 23 (Oct 2025): 102289. link.

African food systems priorities: Governance, collaboration, inclusion, indigenous crops and food, innovative and sustainable solutions for smallholder farmers, food loss.

Producing nutritious and sustainable food for all will require attention to every aspect of Africa's food systems, but research tends to address only one element at a time. Combining insights from a range of projects indicates that indigenous crops, smallholder innovation, and food waste are top priorities, with governance, collaboration, and inclusion as essential foundations.

- This study synthesized results from 19 food system projects in six African countries, conducted by 83 researchers.
- The research showed that indigenous crops are sustainable and resilient, and they can increase the nutritional value of other foods (e.g. adding sweet potato flour to wheat flour). However, to reach their full potential they require assistance such as wide promotion of their health benefits.
- The yields, incomes, and sustainability of the smallholders who supply much of Africa's food could be improved by *practical, context-specific innovations*. These range from digital technologies in local languages to chicken feed made from locally-grown plants.
- Food loss and waste needs to be reduced, which can be difficult in the fragmented and informal value chains that are common in Africa.
- *Governance, collaboration, and inclusion were important themes throughout.* For example, government agriculture and nutrition departments should work together to achieve common goals, but lack of capacity and resources currently prevents this. Innovations must be adapted to local conditions and practical realities, which are best known to local people themselves.
- The research *did not* point to increasing fertilizer use, continued industrialization, or incentives and support for agribusiness corporations as necessary for transforming African food systems.

6 Pezzetta, Silvina. **"The path towards CAFO in Argentina: The 2020 Argentina-China agreement and the absence of animal welfare considerations in the intensification of animal agriculture."** Tiny Beam Fund, 2022. Link (English). Link (Spanish).

Intensification of animal agriculture in Argentina is shaped by various factors, with Chinese investors playing a major role with support from Argentina's government.

There is no single cause for the intensification of animal agriculture in Argentina. While the agreement signed in 2020 between the government of Argentina and Chinese investors to build mega pig farms is a major milestone, it should not be viewed in isolation. Argentina's economy, international trade, government support, tradition in animal agriculture all play important roles.

- What factors have led Argentina to intensify its animal agriculture? How did the 2020 government agreement with Chinese investors to build mega pig farms in the country come about? What were stakeholders' response to this agreement, and did animal welfare matter?
- Argentina identifies strongly with agricultural activities, meat production and consumption. Chicken production is almost completely intensified, and products are consumed domestically. Pig production is mainly extensive or semi-intensive, and the sector aims to increase productivity.
- Argentina's economy and international trade plays a huge role in intensifying the country's animal agriculture, with robust support for the agro-export sector from the government. The introduction of GMO soy in the 1990s led Argentina to pivot towards planting soy to feed Chinese pigs and to intensify its own cattle production.
- The 2020 agreement to invest in mega pig farms is best viewed as a chapter of Argentina's economic, diplomatic, and trade relationship with China, which began in the 2000s. But there was a new driver - the outbreak of the African Swine Flu (ASF) that decimated Chinese pork production.
- Socio-environmental groups were the most active stakeholders and initiated the public debate. With the endorsement of animal rights advocates, they led the opposition to the agreement. Small and medium pork producers were involved in the debate because they feared potential competition from the mega farms.
- Animal welfare did not feature in the agreement and was barely mentioned by stakeholders. The legal framework for farm animal welfare in Argentina is vague and inadequate, and animal welfare training opportunities are lacking.
- Changes need to happen on three levels: Structural (e.g. move away from intensified animal agriculture). Institutional (e.g. support agencies such as INTA and CONICET). Individual (e.g. educate the public).

Brief mention (non-academic reports):

1 *Head In The Cloud: Challenging the false promise of digital agriculture and cultivating innovation from the ground up.* IPES-Food, 2026. link.

- "Today, 'innovation' has become synonymous with the rapid development of AI, precision agriculture, bioengineering, and automation. Governments and donors are investing billions in corporate-led digitalization of farming, promoted as essential for climate resilience and productivity."
- "Head In The Cloud examines how this shift is reshaping power in food systems – concentrating control in the hands of major technology and agribusiness firms, increasing farmer dependency, and reinforcing high-cost, high-input production models."
- "At the same time, the report documents farmer-led and community-based innovations that are strengthening soil health, conserving agrobiodiversity, adapting crops to climate change, and building resilient local food systems. These bottom-up approaches prioritize autonomy, ecological sustainability, and knowledge-sharing – yet remain underfunded and marginalized in policy and investment decisions."

2 *The state of food and agriculture 2025 - Addressing land degradation across landholding scales.* Rome: FAO, 2025. link.

- A report in FAO's flagship collection, it "examines the implications of human-induced land degradation for agricultural production, producers of all scales and vulnerable populations."
- "The report presents new findings on how cropland degradation contributes to the yield gap worldwide against a backdrop of broader degradation processes on other land cover types and even land abandonment. Drawing on the latest data on global farm distribution, farm sizes and crop production, the report highlights how the scale at which land is managed shapes both the constraints and the opportunities for adopting sustainable land use and management practices. It also underscores the importance of policymaking that encompasses regulatory and incentive-based measures, tailored to the varied conditions and scales of land use, to avoid, reduce and reverse land degradation."

About Beacon

Why?

- Tiny Beam Fund's flagship *Burning Questions Initiative* produces a list of 'burning questions'. These questions are asked by issue experts (leaders of advocacy organizations, frontline campaigners, academics collaborating with these organizations) experienced with addressing negative impacts of industrial animal agriculture in low- and middle-income countries. They were invited to contribute pressing, under-researched, practical questions that they considered of most urgency and salience to their work. The current (2026) list is here.
- Every 'burning question' is complex and multifaceted. It would be foolish to believe that there is a single, simple, definitive answer to a question.
- Addressing these questions requires welding together many pieces of nuanced, contextualized information, research findings, and perspectives drawn from a broad knowledge base, a rich knowledge bank of studies by academic researchers. It also requires extracting key messages from these studies.
- This welding and extracting endeavor is arduous. But, "a journey of a thousand miles begins with a single step". We hope that our curated series of key messages – named *Beacon* – will serve as a beacon, guiding all those keen to take the first step.

Who's the audience?

- Those who have contributed to the 'burning questions', those who are curious about these questions, those who are interested in using the research undertaken by academics to address the questions.
- Anyone can access *Beacon* on our website. It is easy to read and understand. No academic jargon!

What's in it?

- Each issue contains 6-8 main items. These are works by academic researchers in peer-reviewed journals from the past couple of years. Also included are reports written for Tiny Beam Fund by recipients of its *Burning Questions Initiative* fellowship awards (they are all PhD holders or PhD students close to obtaining their degrees). 1-2 'Brief mention' non-academic reports may also be included.

Read This Issue